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ORIGINAL

Federal R & D Funding by Budget Function

Fiscal Years 1982-84

Division of Science Resources Studies
National Science Foundation

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Note: Detail in tables may not add to totals because of rounding. Percent and dollar increases and decreases in the text are also based on unrounded numbers and may not conform exactly to amounts shown in or derived from tables.

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PREFACE

This report is the only one that provides a distribution of R&D programs by the functions of the Federal budget. It includes only Federal R&D programs, with R&D plant and all non-R&D activities excluded. The sections of the report are presented in descending order of R&D budget authority for the various functions in the fiscal year 1984 budget. Each section provides a summary table with text, followed by more detailed tables showing the chief R&D program areas within the function. Some 600 R&D programs are identified with their funding levels for fiscal years 1982, 1983, and 1984.

Within the overall Federal budget there is no R&D budget as such, nor are most appropriations for research and development so labeled except in the case of certain program areas in defense, space, energy, and environment. In order to reach an overall Federal R&D figure for analytical purposes the Office of Management and Budget (OMB) requires the agencies to submit data on their R&D programs in terms of basic research, applied research, and development, and by R&D support to universities and colleges. R&D plant data are separately given. The results of the most recent survey were published in "Special Analysis K: Research and Development" as one of the documents of the 1984 Federal budget. This provided a broad view of the R&D portion of the budget along with brief descriptions of the R&D programs of the larger support agencies. It did not, however, provide an array by budget functions or by detailed programs. This report attempts to answer the need for that kind of overview.

The sources of data for this report were the reports (Exhibit 44's) made by the agencies to OMB for the special analysis. In addition to these exhibits, budget justification documents of the leading R&D support agencies were also drawn upon to provide greater detail. Some information was additionally provided informally by some of the smaller agencies.

For organizational purposes the budget is divided into 17 functional areas, including interest. Funding for these functions plus allowances and undistributed offsetting receipts make up the budget total with no overlap occurring between functions or the agency programs within the functions. An immediate comparison is thus obtainable of the relative emphasis given to various areas of Federal responsibility. By categorizing R&D program data by these same budget functions the ratio of R&D funding to total Federal funding within each function can be viewed as one measure of the role assigned to research and development in meeting the needs embodied in the functions.

By another comparison, the amounts of R&D funding by functions, shown together, provide a measure of relative R&D emphases and an indication of the kinds of resources within the "R&D producing" sectors of the economy that are likely to be called upon.

Function categories and definitions used in this report are the same as those used in the budget, with one exception. The budget function of general science, space, and technology has been divided into two functions: Space research and technology and general science. Two budget functions, general purpose fiscal assistance and interest, have no R&D components.

All the data shown in the following pages are based on budget authority dollars rather than obligations or outlays since budget authority is the basis of congressional funding decisions. The data shown agree for the most part with budget authority data supplied to OMB by the agencies. Some changes were made on the basis of information not available at the time the special analyses were prepared.

CONTENTS Page

Research and Development in the 1984 Budget 1

National Defense 5

Health 9

Energy 17

Space Research and Technology 38

General science 47

  Basic Research 58

Transportation 60

Natural Resources and Environment 63

Agriculture 73

Education, Training, Employment, and Social Services 77

International Affairs 79

All Other Functions: Veterans Benefits and Services, Commerce and Housing Credit, Income Security, Administration of Justice, Community and Regional Development, and General Government 80

RESEARCH AND DEVELOPMENT IN THE 1984 BUDGET

Total budget authority for all R&D programs, as proposed in the 1984 budget, is $45,663 million, 19 percent higher than the 1983 total of $38,455 million, allowing for considerable real growth. This increase contrasts with the 6-percent increase in 1984 budget authority in the overall Federal budget.

The 1984 budget continued to embody efforts made in the two previous budgets to reduce the growth of overall Federal spending by eliminating activities that overstep the bounds of proper Federal responsibilities and restraining growth in other areas. Federal R&D support was targeted especially at national security, basic research, and long-term energy technologies, such as magnetic fusion. Within basic research special emphasis was given to the physical sciences and engineering as an aid to national defense and to U.S. competitiveness in high technology industries.

High priority is given in the 1984 budget, as in the 1983 budget, to improving national defense capabilities. In the three most recent budgets consistent real increases have been provided to defense and consistent decreases to energy and natural resources and environment programs, with the largest decreases directed to energy.

The leading features of R&D planning in the 1984 budget are as follows:

- An increase of $7,071 million, or 28 percent in national defense R&D programs, following large relative increases in 1982 and 1983.
- A decrease of $14 million, or 1 percent, for space research and technology, with emphasis given to space science programs.
- An increase of $107 million, or 3 percent, in health R&D activities, below the anticipated inflation rate, compared with a 10-percent gain in 1983.
- A decrease of $274 million, or 11 percent, in energy R&D programs, following a decrease of $432 million, or 14 percent, in 1983.
- An increase of $506 million, or 9 percent, for basic research, providing for some real growth; without defense, an increase of 8 percent in basic research in 1984 with every functional area but health and natural resources and environment scheduled for increases ahead of the anticipated inflation rate.

- An increase of $228 million, or 15 percent, in general science programs in 1984, ahead of inflation, compared with a 10-percent gain in 1983.
- An increase of $197 million, or 22 percent, for transportation R&D activities in 1984, compared with a 13-percent increase in 1983, both years reflecting real growth.
- A decrease of $139 million, or 15 percent, in natural resources and environment R&D programs in 1984, following a decrease of 4 percent in 1983.

R&D budget authority in 1984 is 5.1 percent of total Federal budget authority, compared with 4.6 percent and 4.5 percent, respectively in 1982 and 1983.

Shares of the R&D total

R&D priorities, measured in terms of shares of the total held by various functional areas, have continued to shift over the 1982-84 period, with the most dramatic change occurring in national defense. This functional area accounted for 61 percent of the total in 1982, then grew to 65 percent in 1983 and 70 percent in the 1984 budget.

The share held by the health function has been relatively constant over the 1982 to 1984 period, at approximately 11 percent. The energy share, however, has fallen from 8 percent in 1982 to 5 percent in 1984 and the space share, from 7 percent to 4 percent in the same period.

In 1984 the five leading functions--national defense, health, energy, space, and general science--account for 93 percent of the total. Transportation, natural resources and environment, and agriculture each represent 2 percent. The remaining eight functions together account for almost 2 percent of the total.

Budget authority for research and development by budget function[a]
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$36,115	$38,455	$45,663
National defense	22,070	24,913	31,984
Health	3,869	4,249	4,356
Energy	3,012	2,580	2,306
Space research and technology	2,584	1,883	1,897
General science	1,359	1,492	1,720
Transportation	791	894	1,091
Natural resources and environment	965	927	788
Agriculture	693	747	748
Education, training, employment, and social services	228	220	226
International affairs	165	152	161
Veterans benefits and services	139	158	159
Commerce and housing credit	104	107	91
Income security	32	42	43
Administration of justice	31	33	42
Community and regional development	63	48	39
General government	10	10	12

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[a] Listed in descending order of 1984 budget authority. One budget function--general science, space and technology--has been divided into two functions in this analysis: Space research and technology, and general science.

Annual percent change in R&D budget authority for leading R&D support areas
/Dollars in millions/

	1982 actual	1983 estimate	Percent change 1982/83	1984 estimate	Percent change 1983/84
Total	$36,115	$38,455	6.5%	$45,663	18.7%
National defense	22,070	24,913	12.9	31,984	28.4
Health	3,869	4,249	9.8	4,356	2.5
Energy	3,012	2,580	-14.3	2,306	-10.6
Space research and technology	2,584	1,883	-27.1	1,897	0.7
General science	1,359	1,492	9.8	1,720	15.3
Transportation	791	894	13.0	1,091	22.0
Natural resources and environment	965	927	-3.9	788	-15.0
Agriculture	693	747	7.8	748	0.1
Education, training, employment, and social services	228	220	-3.5	226	2.7
International affairs	165	152	-7.9	161	5.9
Veterans benefits and services	139	158	13.2	159	1.1
All other functions	240	240	-	227	-5.4

NATIONAL DEFENSE

Approximately 31 percent of total Federal budget authority in 1984 is accounted for by the national defense function. As a fraction of total Federal R&D budget authority in 1984, defense R&D activities represent approximately 70 percent--the highest share since 1962. Over the 1982-84 period alone, the defense share of the Federal R&D total has grown nearly nine percentage points.

In 1984, defense R&D budget authority is expected to grow $7,071 million over the 1983 level, reaching $31,984--an increase of 28 percent. The R&D activities in this function are sponsored by the Department of Defense (DOD) and the Department of Energy (DOE).

The key features of proposed 1984 R&D support within the defense function are as follows:

- An increase of 10 percent in DOD technology base between 1983 and 1984, to a total of $3,544 million. Basic research, included in technology base, is expected to advance 10 percent to a total of $869 million.
- An increase of 50 percent in advanced technology development, with emphasis on the Very High Speed Integrated Circuits program.
- An increase of 55 percent in DOD strategic programs, with most of the increase directed toward the Peacekeeper (M-X) and Trident II missile systems.
- An increase of 22 percent in DOD tactical programs in 1984.
- An increase of 31 percent in DOD intelligence and communications programs.
- An increase of 10 percent in DOE atomic energy defense activities in 1984.

R&D budget authority in 1984 for national defense is an estimated 11 percent of total budget authority for defense.

Department of Defense - Military

DOD programs account for 94 percent of all national defense R&D budget authority in 1984. Virtually all defense R&D programs are funded under the research, development, test and evaluation (RDT&E) appropriation.

In the 1984 budget, all mission areas of the RDT&E appropriation receive increased support. Total budget authority for RDT&E would grow from $22,491 million to $29,344 million, or an increase of 30 percent.

Technology base is proposed to reach $3,544 million--an increase of 10 percent, or $331 million above 1983. This mission area supports programs of research as distinct from development. Basic research programs account for nearly 25 percent of technology base. Budget authority for these activities would grow 10 percent above the 1983 level, continuing a period of steady growth since 1976.

Advanced technology development is expected to grow 50 percent in 1984, for an increase of $413 million. The activity expected to receive the largest increase is that dealing with very high speed integrated circuits.

Strategic programs--the largest mission area in 1984 budget authority--are expected to grow 55 percent, or $3,259 million above the 1983 figure, for a total of $9,160 million. Approximately three-fifths of the total increase scheduled for strategic programs is accounted for by the Peacekeeper (M-X) and Trident II missile systems. Budget authority for the Trident II is nearly quadruple the 1983 figure. Other areas receiving continued emphasis are the Army ballistic missile defense systems technology program and the Air Force B-1B multi-role bomber and space defense systems.

Tactical programs, with 1984 budget authority of $8,850 million, are expected to increase 22 percent, or $1,621 million over the 1983 level. Efforts within this mission area which receive emphasis in the 1984 budget include upgrades to the Army M-1 tank and Bradley Fighting Vehicle Systems and increased attention to work on remotely piloted vehicles and some areas of air defense. Air Force programs include work on an advanced medium-range air-to-air missile, a more reliable fighter engine, a deep strike interdiction version of an existing fighter aircraft, and a new trainer aircraft. The Navy would continue work on a lightweight antisubmarine torpedo, a new longer-range antisubmarine missile, and a new destroyer.

Intelligence and communications programs in the 1984 budget show an increase of $851 million, or 31 percent, to a total of $3,576 million. Included in this mission area is continued effort on communications satellites, radios that will work in the electronics noise of the battlefield, and surveillance radars.

R&D budget authority for national defense
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$22,070	$24,913	$31,984
Department of Defense - military	20,539	23,183	30,066
Research, development, test and evaluation	19,897	22,491	29,344
Technology base	2,933	3,213	3,544
Advanced technology development	751	820	1,233
Strategic programs	4,636	5,901	9,160
Tactical programs	6,890	7,229	8,850
Intelligence and communications	2,160	2,725	3,576
Defensewide mission support	2,527	2,603	2,982
Other DOD military	642	692	722
Atomic energy defense activities (DOE)	1,525	1,727	1,905
Weapons research, development and testing	949	1,050	1,190
Naval reactors development	277	329	370
Inertial confinement fusion	122	140	127
Defense waste and by-products management	71	71	88
Materials production	49	81	65
Nuclear safeguards and security	38	37	41
Verification and control	19	20	24
Federal Emergency Management Agency	6	4	13

Defensewide mission support is expected to increase $379 million, or 15 percent, in 1984, reaching a total of $2,982 million. This activity supports ranges and test facilities and studies and analyses as well as major DOD support for the space shuttle.

Atomic energy defense activities (DOE)

Proposed R&D budget authority for atomic energy defense activities is $1,905 million in 1984--10 percent more than in 1983, for an increase of $178 million. These programs account for approximately 6 percent of total 1984 national defense budget authority.

Weapons research, development and testing accounts for 62 percent of atomic energy defense activities, or $1,190 million in 1984, an increase of 13 percent over 1983. Naval reactors development, with 19 percent of the total, or $370 million, is expected to grow by 12 percent.

Among the remaining programs, only defense waste and by-products management shows a significant increase over the 1983 level, growing 24 percent for a total of $88 million. Nuclear safeguards and security, and verification and control are expected to grow somewhat in 1984 budget authority, while inertial confinement fusion and materials production show decreases.

HEALTH

R&D budget authority for health is proposed to increase $107 million, or 3 percent, in 1984 over 1983, to a total of $4,356 million. Almost all programs within this function are conducted by the Department of Health and Human Services (HHS). Almost 90 percent of these funds will support biomedical research conducted by the National Institutes of Health (HHS). Notable features of the proposed 1984 R&D health programs include the following:

- A 3-percent increase in health basic research, to $2,238 million.
- A 2-percent increase, to $3,842 million, for the National Institutes of Health (HHS).
- A 13-percent increase, to $314 million, for the Alcohol, Drug Abuse, and Mental Health Administration (HHS).

R&D budget authority for health as a share of total budget authority for health is an estimated 5 percent in 1984.

R&D budget authority for health
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$3,869	$4,249	$4,356
Health research	3,792	4,167	4,268
National Institutes of Health (HHS)	3,435	3,772	3,842
Alcohol, Drug Abuse, and Mental Health Administration (HHS)	244	278	314
Centers for Disease Control (HHS)	75	70	75
Disease control	21	21	23
Occupational health	53	50	52
Assistant Secretary for Health (HHS)	16	16	18
Health Care Financing Adm. (HHS)	11	20	18
Health Resources and Services Administration (HHS)	12	10	1
Consumer and occupational health and safety	78	82	88
Food and Drug Administration (HHS)	73	77	82
Occupational Safety and Health Adm. (Labor)	5	6	6

National Institutes of Health (HHS)

The primary mission of the National Institutes of Health (NIH) is to advance research in the prevention, diagnosis, and treatment of disease through biomedical research.

The 1984 proposal of $4,268 million for NIH is an increase of $70 million, or 2 percent, over the 1983 funding level. Each of the 11 separate institutes would receive slight increases in 1984, varying from 1 percent to 3 percent. Absolute increases range from $2 million to $8 million.

The National Cancer Institute, with $963 million in 1984 R&D budget authority, commands one-quarter of the NIH 1984 budget. This represents a 1-percent, or $8 million, increase over 1983. Individual increases would emphasize research on carcinogenesis, diagnostics, cancer control, and epidemiology. Programs in clinical and preclinical treatment research would receive lower 1984 funding levels than 1983.

The National Institute of General Medical Sciences and the National Institute of Allergy and Infectious Diseases each expect to receive an $8 million, or 3-percent, increase in 1984. Much of the increase for General Medical Sciences is slated for research on cellular and molecular bases of disease and pharmacological sciences. The increase for Allergy and Infectious Diseases would stress microbiology and augment intramural research efforts.

The National Institute of Dental Research is proposed for a 3-percent increase in 1984, up $2 million over the 1983 level, to $77 million. The increase is spread among many of this Institute's programs.

Budget authority for the Division of Research Resources is proposed to increase $15 million, or 7 percent, in 1984. The Division awards grants and contracts to research institutions and individual investigators for biomedical research to support the NIH mission.

R&D budget authority for the National Institutes of Health (HHS)
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$3,435	$3,772	$3,842
Cancer	915	954	963
Epidemiology	NA	61	62
Carcinogenesis (physical and chemical)	NA	95	94
Biological carcinogenesis	NA	91	94
Nutrition	NA	18	19
Tumor biology	NA	116	115
Immunology	NA	79	79
Diagnostic research	NA	41	43
Preclinical treatment research	NA	150	148
Clinical treatment research	NA	153	151
Rehabilitation research	NA	2	1
Cancer centers support	NA	79	80
Cancer control	NA	57	62
Direct operations and program management	NA	14	16
Heart, Lung, and Blood	534	592	596
Heart and vascular diseases	NA	336	336
Lung diseases	NA	86	86
Blood diseases and resources	NA	83	83
Intramural research	NA	53	56
Direct operations and program management	NA	35	36
Arthritis, Diabetes, and Digestive and Kidney Diseases	350	392	399
Arthritis, musculoskeletal and skin diseases	NA	67	68
Diabetes, endocrinology and metabolism	NA	137	138
Digestive diseases and nutrition	NA	57	57
Kidney diseases, urology, and hematology	NA	63	64
Intramural research	NA	53	57
Direct operations and program management	NA	15	16
General Medical Sciences	288	319	327
Cellular and molecular basis of disease	NA	103	105
Genetics	NA	129	130
Pharmacological sciences	NA	40	45
Physiology and biomedical engineering	NA	35	35
Intramural research	NA	1	1
Direct operations and program management	NA	10	11

Neurological and Communicative Disorders and Stroke	257	285	291
Biological basis research	NA	133	132
Clinical research	NA	92	96
Intramural research	NA	43	45
Direct operations and program management	NA	17	17
Allergy and Infectious Diseases	228	264	272
Immunology, allergic and immunologic diseases	NA	80	81
Microbiology and infectious diseases	NA	122	125
Intramural research	NA	49	51
Direct operations and program management	NA	14	15
Child Health and Human Development	217	243	247
Research for mothers and children	NA	112	113
Population	NA	89	89
Intramural research	NA	30	31
Direct operations and program management	NA	13	13
Environmental Health Sciences	148	157	161
Characterization of hazards	NA	16	14
Biological response	NA	21	17
Applied toxicological research	NA	51	55
Biometry and risk estimation	NA	4	5
Resource development	NA	12	12
Intramural research	NA	47	52
Direct operations and program management	NA	6	6
Eye	124	137	139
Retinal and choroidal diseases	NA	51	51
Corneal diseases	NA	18	18
Cataract	NA	11	11
Glaucoma	NA	12	13
Strabismus, amblyopia and visual processing	NA	26	26
Intramural research	NA	15	16
Direct operations and program management	NA	6	6
Aging	79	91	93
Aging research	NA	67	66
Intramural research	NA	17	19
Direct operations and program management	NA	7	8

Dental Research	68	74	77
Caries research	NA	12	13
Periodontal diseases	NA	9	10
Restorative materials	NA	4	4
Craniofacial anomalies	NA	8	8
Pain control and behavioral studies	NA	3	4
Soft tissue stomatology and nutrition	NA	8	7
Dental research institutes	NA	8	8
Intramural research	NA	16	17
Direct operations and program support	NA	5	6
Research Resources	183	213	228
Clinical research	NA	75	81
Biotechnology research	NA	25	27
Laboratory animal sciences and primate research	NA	27	29
Biomedical research support	NA	60	63
Minority biomedical research support	NA	20	21
Direct operations and program management.	NA	7	7
John E. Fogarty International Center	9	10	12
National Library of Medicine	12	13	13
Office of the Director	22	24	25

Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA)

The $314 million requested in the 1984 budget for Alcohol, Drug Abuse and Mental Health Administration (ADAMHA) R&D programs is 13 percent higher than the 1983 funding level. Each of the three major institutes--the National Institute of Mental Health, the National Institute on Drug Abuse, and the National Institute on Alcohol Abuse and Alcoholism--is expected to receive increased R&D funding for both intramural and extramural programs. Extramural research programs represent 65 percent of the agency's R&D activities. The 1984 budget proposed to increase the level for extramural research programs in biomedical, biobehavioral, and clinical areas.

General mental health budget authority, at $172 million, is a 9-percent increase over the 1983 level. Programs will continue to support basic and applied research in neurosciences, behavioral sciences, psychopharmacology, and treatment and services to the mentally ill.

Drug abuse R&D programs are scheduled for a 19-percent increase--up $9 million, to $56 million. Basic research on prevention and treatment of drug abuse will continue new research efforts to address problems of drug abuse among youths.

For alcoholism research the $46 million budget request is $13 million, or 38 percent, higher than in 1983. Funding supports and stimulates the development of new knowledge of the causes and consequences of harmful alcohol use, as a means of reducing the incidence and prevalence of alcohol abuse and alcoholism. Funding is also included to expand the epidemiology program.

Prevention is the chief focus of research in all three institutes.

R&D budget authority for the Alcohol, Drug Abuse, and Mental Health Administration (HHS)
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$244	$278	$314
General mental health research	144	158	172
Extramural research	103	107	119
Schizophrenic disorders	14	14	17
Depression and manic depressive illnesses	12	12	14
Mental disorders of aging	6	6	7
Childhood disorders	10	10	11
Anxiety disorders	4	4	5
Stress and psychosomatic disorders	6	6	8
Basic studies in brain and behavior	25	26	30
Epidemiology	8	9	10
Prevention	8	8	10
Demonstration	6	6	-
Other mental health areas	5	6	6
Intramural research	41	51	53
Drug abuse research	41	47	56
Extramural research	37	43	51
Basic drug research	6	9	10
Heroin and narcotics	11	8	8
Marijuana and cannabinoids	3	5	7
Cocaine and stimulants	4	4	5
Sedatives and tranquilizers	1	2	2
Hallucinogens	2	2	2
Other drugs of abuse	3	3	4
Prevention	3	4	6
Epidemiology	5	5	7
Intramural research	4	5	6
Alcoholism research	23	33	46
Program support	35	39	40
St. Elizabeth's Hospital	2	-	-

Centers for Disease Control (HHS)

This agency shows proposed R&D budget authority of $75 million in 1984, up $5 million, or 7 percent from 1983. Funding would support applied research on prevention and control of diseases.

Food and Drug Administration (HHS)

The $82 million in R&D budget authority proposed in 1984 for this agency represents a $6 million, or 7-percent, increase over 1983. These funds would support research to assure the safety and efficacy of drugs, medical devices, and food.

ENERGY

The R&D request for energy programs in 1984 is $2,306 million in budget authority, 11 percent less than the $2,580 million shown for 1983. This budget request reflects the continuation of administration policies to phase down federally sponsored R&D programs that accelerate the introduction of nonnuclear energy technologies. The energy function includes support for the development of selected nuclear energy technologies of a high-risk but potentially high-payoff nature, such as breeder reactors and magnetic fusion, where significant private investment is not likely without further Federal development. In addition, the energy function includes continuing research in nonnuclear programs, supporting research, and research on the environmental and human health effects of a variety of energy production technologies.

Three agencies are included in R&D efforts in energy: the Department of Energy (DOE), the Nuclear Regulatory Commission (NRC), and the Environmental Protection Agency (EPA). Major changes in 1984 for energy R&D programs are as follows:

- An increase of 13 percent in basic research in 1984 over 1983, to $322 million.
- An increase of 9 percent, to $393 million, for magnetic fusion R&D activities.
- An increase of 7 percent, to $762 million, for nuclear fission R&D programs, including a 13-percent increase, to $571 million, for breeder reactor systems programs, chiefly represented by the Clinch River breeder reactor plant project.
- A decrease of $176 million, or 57 percent, to $131 million for fossil energy programs, including a $159 million decrease, to $103 million, in coal R&D programs.
- Decreases of 55 percent, to $86 million, in solar energy R&D programs; of 54 percent, to $62 million, in energy conservation; of 39 percent, to $14 million, in geothermal programs; and of 38 percent, to $27 million, in electric energy and energy storage systems programs.
- An increase of 9 percent, to $132 million, for uranium enrichment R&D programs.

Energy R&D budget authority as a percent of total energy budget authority is 79 percent in the 1984 budget.

R&D budget authority for energy
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$3,012	$2,580	$2,306
Department of Energy	2,744	2,345	2,083
Solar	259	192	86
Geothermal	46	22	14
Hydropower	3	1	-
Nuclear fission	931	715	762
Magnetic fusion	295	362	393
Electric energy and energy storage systems	58	43	27
Biological and environmental research	196	174	162
Supporting research	241	274	314
Fossil energy	408	307	131
Energy conservation	151	134	62
Uranium enrichment	156	122	132
Nuclear Regulatory Commission	220	210	200
Environmental Protection Agency	48	25	24

Solar energy

Proposed R&D budget authority for solar energy programs reflects a decrease of $106 million, or 55 percent, in 1984 to a total of $86 million. The 1984 focus is on research of a generic, long-range nature, exploring new concepts of renewable energy technologies in the development of a sound technology base for private sector initiatives.

Solar energy investigations, though greatly reduced, will emphasize solar heat technologies, photovoltaic energy systems, and biomass energy technology. Technology development activities in alcohol fuels and ocean energy systems would be eliminated in 1984, and wind energy systems work would be cut by more than two-thirds.

Funding of $10 million for international solar energy in 1983 represents the final request to complete the United States commitment to the Saudi Arabian government for solar applications under the Project Agreement for Cooperation in the Field of Solar Energy (SOLERAS).

R&D budget authority for solar energy
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$259	$192	$ 86
Solar heat technologies	74	55	22
Photovoltaic energy systems	71	58	33
Materials research	NA	NA	21
Cell theory and validation studies	NA	NA	6
Analysis, testing, and reliability studies	NA	NA	7
Biomass energy technology	20	16	17
Thermochemical conversion	NA	NA	4
Biochemical conversion	NA	NA	12
Production	NA	NA	1
Alcohol fuels	10	5	-
Wind energy systems	34	31	9
Aerodynamics research	NA	NA	4
Structural research	NA	NA	4
Small wind systems test center	NA	NA	2
Ocean energy systems	20	7	-
International solar energy	4	10	-
Solar technology transfer[a]	7	3	3
Solar technical information	NA	NA	3
Reproduction and distribution	NA	NA	(b)
Mandated reports	NA	NA	(b)
Solar reserve account	12	-	-
Program support	3	1	-
Program direction	4	6	3

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[a] In the 1983 budget this program element was entitled "Solar information systems."
[b] Less than $500,000.

Geothermal energy

R&D budget authority for geothermal energy in the 1984 budget is $14 million, down $9 million, or 39 percent, from the $22 million estimated for 1983. Funding would provide alternative means of meeting the Nation's energy demands by performing high-risk, high-payoff research that would build a technology base for future geothermal development by the private sector.

Funding would continue at a greatly reduced level for geothermal technology transfer in hot dry rock and hydrothermal technology. Three new program ares cover identifying reservoir prospects under the magma energy extraction research program; analyzing the mechanics of rock penetration under downwell conditions in the hard-rock penetration program; and providing technical information to scientists through the geothermal technology transfer program. No funds are requested for hydrothermal industrialization.

R&D budget authority for geothermal energy
[Dollars in millions]

	1982 actual	1983 estimate	1984 estimate
Total	$46	$22	$14
Hydrothermal industrialization	9	2	-
Geopressure resources	17	4	-
Geothermal technology development	20	15	9
Hot dry rock technology	10	8	5
Hydrothermal technology	10	7	4
Hard rock preparation research	-	-	3
Magma energy extraction research	-	-	1
Geothermal technology transfer	-	-	(a)
Program direction	2	1	(a)

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[a] Less than $500,000.

Nuclear fission

An increase of $47 million, or 7 percent, to $762 million is anticipated in R&D budget authority for nuclear fission in 1984. The strategy for the nuclear fission program includes a relatively large cutback in converter reactor systems and increased emphasis on breeder reactor systems.

A decrease of $22 million, or 31 percent, to $49 million, for converter reactor systems activities includes the termination of the high temperature reactors and advanced reactor systems programs. The light water reactor (LWR) systems program is expected to increase slightly to support the Department's Nuclear Regulatory Reform proposals, especially in developing safety technology for implementation by the private sector. Three Mile Island (TMI) activities are proposed for $33 million, up $9 million, to continue the development work associated with the waste immobilization and reactor evaluation program.

A proposed decrease of $18 million, or 47 percent, for the commercial waste management program reflects funding transfer to the Nuclear Waste Disposal Fund for project-specific activities leading to site selection, construction, and operation of a high level waste repository.

The remedial actions program is scheduled to increase 92 percent, or $25 million, to $52 million in 1984. The increase in the budget request is for the West Valley project, which is accelerating activities in order that actual solidification of high-level waste can begin by late 1990.

A proposed increase of $67 million, or 13 percent, to $571 million in the breeder reactor systems program would support continued development of the liquid metal fast breeder reactor (LMFBR), offsetting by far decreased activities on the water-cooled breeder reactor. The LMFBR is designed to provide virtually inexhaustible supplies of electrical energy for the long run as well as additional support to conventional nuclear deployment in the short run. The program includes the final design, construction, and operation of the Clinch River breeder reactor plant; this project is proposed for an $82 million, or 44-percent increase to $270 million in 1984. The LMFBR base program, scheduled at $241 million in 1984, supports plant demonstration and technology efforts in reactor fuels, components, physics, and safety.

Nuclear fuel cycle program activities are scheduled to decrease slightly from the 1983 level to $37 million. Emphasis would continue on closure of the light water reactor (LWR) fuel cycle through reprocessing and development of the LMFBR fuel cycle.

The $32 million R&D request for 1984 in the advanced nuclear systems program represents a $5 million, or 13-percent, decline from the 1983 level. A major activity would continue to be the development of isotope power sources for the NASA Galileo spacecraft, planned for launch in 1986, and the NASA/European Space Agency (ESA) solar polar spacecraft, also planned for launch in 1986.

R&D budget authority for nuclear fission
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$931	$715	$762
Converter reactor systems	84	71	49
High temperature reactors	34	33	-
Light water reactor systems	22	10	15
Three Mile Island activities	24	24	33
Advanced reactor systems	4	4	-
Program direction	1	(a)	1
Commercial nuclear waste	187	38	20
Remedial actions	27	27	52
Breeder reactor systems	557	504	571
Liquid metal fast breeder reactor (LMFBR)	497	451	526
Clinch River breeder reactor plant project	NA	188	270
Large scale prototype breeder	NA	15	15
Base program	NA	248	241
Engineering systems and components	NA	30	30
Fuels and core design	NA	37	33
Materials and structure	NA	10	9
Physics	NA	9	9
Safety	NA	33	33
Test facilities	NA	124	123
Safeguards and program assurance	NA	5	5
Water cooled breeder	51	45	36
Defueling activities	NA	34	33
Core evaluation	NA	11	3
Program direction	10	8	10
Nuclear fuel cycle	41	38	37
Fuel processing R&D	34	32	31
Spent fuel technology	6	5	5
Program direction	1	1	1
Advanced nuclear systems	35	36	32
Space and special applications	34	35	30
Flight systems development	NA	16	14
Flight systems support	NA	19	16
Special applications	NA	-	1
Program direction	1	1	1

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[a] Less than $500,000.

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Magnetic fusion

R&D budget authority for the magnetic fusion program shows an increase of $31 million, or 9 percent, to a total of $393 million in 1984. Confinement systems, the largest program within magnetic fusion, received a $5 million, or 3-percent, gain to $186 million in the budget proposal. The increase provides continued support for demonstration projects of basic tokamak physics within the toroidal confinement systems program as well as support for the production of a steady-state source of fusion power within the mirror confinement systems program.

Planning and projects programs would receive the largest relative increase within magnetic fusion--68 percent, or $20 million, to $49 million in 1984. Funding would provide emphasis for major plasma scaling tests as well as providing technology development information systems during the testing period. Funding of $21 million is requested for continuing the tokamak fusion test reactor (TFTR) flexibility modifications, which will primarily enable the TFTR to operate in a physics regime in which self heating of the plasma occurs as a result of the burning of the fusion fuel. The requested funding level of $25 million for the mirror fusion test facility (MFTF) provides for development of key MFTF systems, auxiliary component fabrication, and facility preparation.

The scheduled $3 million, or 4 percent, increase to $77 million in development and technology programs would provide technology support to the major existing confinement experiments (TFTR and MFTF); develop the critical engineering and technological basis needed for selection of the most attractive confinement and technology for the Engineering Test Reactor (ETR); and support key long-term engineering requirements for developing commercial fusion, especially in the area of fusion reactor materials.

The applied plasma physics program shows a proposed increase of $3 million, or 4 percent, to $76 million. Funds would continue to develop applied physics knowledge through theoretical studies and small experiments for advancement of the fusion program. This program also develops promising fusion ideas for use in tokamaks and mirrors. This program helps to train a large percentage of the plasma physicists and engineers employed in all areas of the fusion program through support of research in universities.

R&D budget authority for magnetic fusion
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$295	$362	$393
Applied plasma physics	67	73	76
Advanced fusion concepts	17	19	20
Experimental plasma research	15	17	17
Fusion theory	21	22	23
National MFE computer network	13	16	16
Confinement systems	124	181	186
Toroidal confinement systems	89	138	144
Mirror confinement systems	35	43	42
Development and technology	70	74	77
Magnetic systems	15	16	17
Plasma engineering	15	19	18
Fusion reactor materials	15	17	19
Fusion systems engineering[a]	11	13	12
Environment and safety	3	3	3
Fusion energy applications	2	2	1
Engineering reactor design and development	9	5	8
Planning and projects	31	29	49
Tokamak fusion test reactor	17	18	21
Mirror fusion test facility	9	8	25
Fusion materials irradiation test facility	5	3	3
Program direction	4	4	5

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[a] Includes funding for the Center for Magnetic Fusion Energy.

Electric energy and energy storage systems

R&D budget authority for electric energy systems shows a proposed decrease of $4 million, or 26 percent, to $13 million. Proposed funding would cover generic, long range research for future electrical transmission, distribution, and storage. It includes studies of electric field effects, high voltage technology, underground transmission, communications and operations, system coordination and control, and electrical storage technology research.

R&D budget authority for energy storage systems in 1984 is $14 million, down $12 million, or 45 percent, from the $26 million estimated in 1983. The 1984 funding level represents the planned elimination of the physical and chemical energy storage program and emphasizes research in exploratory development and experimental testing of electrochemical storage and conversion technologies. The program is directed toward conducting long-term, high-risk, potentially high-payoff research efforts in electrochemical technology that will stimulate further development by the private sector. Work includes improved technology for electric vehicles and stationary storage applications.

R&D budget authority for electric energy and energy storage systems
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$58	$43	$27
Electric energy systems	21	17	13
Systems architecture and integration	6	-	-
Power delivery	12	-	-
Generation and storage analysis	2	-	-
Electric fields effects	-	3	2
Reliability R&D	-	4	4
Systems technology	-	10	7
Program direction	1	1	(a)
Energy storage systems	37	26	14
Electrochemical energy storage	25	18	14
Physical and chemical energy storage	12	7	-
Program direction	1	1	(a)

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[a] Less than $500,000.

Biological and environmental research

The $162 million requested in the 1984 budget for biological and environmental research represents a 7-percent, or $13 million, decrease from 1983. In 1984, all programs except carbon dioxide research and nuclear medicine applications, would be reduced. Continued effort would be given to the long-term effects of low levels of radiation. Long-term investigations of pollutant effects on human populations and experimental animals would be continued. Research to better understand the mechanisms controlling biological systems to low exposures of neutrons, gamma rays, and radionuclicles would be intensified. Research on the effects of energy-related chemicals would continue to be reduced and redirected to more generic and long-term health and environmental issues.

R&D budget authority for biological and environmental research
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$196	$174	$162
Human health research	26	26	24
Health effects research in biological systems	67	58	52
Environmental research	29	26	23
Physical and technological research	36	29	26
Carbon dioxide research	12	9	12
Health and environmental risk analysis ..	4	2	–
Nuclear medicine applications[a]	19	21	21
Program direction	3	3	4

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[a] Program transfer from the Department of Energy general science function.

Supporting research

R&D budget authority for supporting research programs shows an increase of $40 million, or 15 percent, to a total of $314 million. Approximately 94 percent of this total can be accounted for in basic energy sciences projects, which show a $35 million, or 13-percent, increase to $296 million in 1984.

The basic energy sciences (BES) program is responsible for long-range basic research to provide the fundamental scientific and engineering base on which the Nation's future energy options depend. The major product of the BES program is increased knowledge developed by sponsoring research in the traditional disciplines: materials sciences (up 15 percent to $125 million); chemical sciences (up 8 percent to $76 million); nuclear sciences (up 24 percent to $38 million); and engineering, mathematical and geosciences (up 8 percent to $34 million). In addition to this focus on disciplinary research, there is also an emphasis on innovative applications of new knowledge to energy problems, and on the early application and, if possible, direct commericialization of the results.

The budget proposed in 1984 for university research support is $5 million, a decrease of $1 million, or 17 percent. Specifically, this program focuses on continued utilization of the unique resources of the national laboratories (equipment, instrumentation, and personnel) by university faculty as well as on expediting the transfer of university-based energy research to potential users in the private sector.

A new program initiative of $6 million is proposed for 1984 for university research instrumentation. This program is part of a combined public/private sector effort to help alleviate the serious national shortage of state-of-the-art scientific instrumentation in the major research universities.

R&D budget authority for supporting research
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$241	$274	$314
Basic energy sciences	224	261	296
Materials sciences	96	109	125
Chemical sciences	63	70	76
Nuclear sciences	22[a]	31[b]	38
Engineering, mathematical and geosciences	25	31	34
Advanced energy projects	7	8	9
Biological energy research	8	10	11
Program direction	3	3	4
Energy research analysis	2	3	3
University research support	10	6	5
University/national laboratory cooperative research program	8	6	5
Energy manpower development program	2	-	(c)
Advisory and oversight program direction	3	3	3
University research instrumentation	-	-	6
Policy and management energy research[d]	1	1	1

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[a] Operating funds of $12 million previously budgeted in this subprogram for low energy nuclear physics research are now being budgeted under the nuclear physics program.

[b] Reflects the transfer of the Stanford Synchrotron Radiation Laboratory from the National Science Foundation. Funds associated with this facility are $7 million in FY 1983.

[c] Less than $500,000.

[d] Reflects comparability adjustments to general science program direction of $575,000 and $272,000 in FY 1982 and FY 1983, respectively; and to biological and environmental research of $57,000 and $150,000 in FY 1982 and FY 1983, respectively.

Fossil energy

Budget authority for fossil energy R&D programs in 1984 is requested at $131 million, or 57 percent, less than the total of $307 million. Support for fossil energy R&D is geared toward establishing an adequate scientific and engineering knowledge base to foster technological advances through private sector initiative as well as to remove key investment uncertainties. The DOE Office of Fossil Energy has reoriented its program to meet the newly defined roles of the private sector and government in technology development. The proposed 1984 budget covers activities that attract little or no private sector funding in the case of the three subprogram areas.

Coal R&D budget authority shows a $159 million, or 61-percent, decrease to $103 million in 1984, with reductions in all programs. Large decreases are proposed for coal liquefaction, combustion systems, fuel cells, and surface coal gasification. The magnetohydrodynamics program is scheduled for termination. This coal R&D program would support front-end R&D activities that will permit the private sector to continue development of technologies beyond the proof-of-concept stage and take them to commercialization. Efforts within the advanced research and technology development program include fundamental research related to coal chemistry, pollutant control, and waste water treatment, pulverized coal combustion studies, and studies of the basic phenomena in materials degradation of fossil energy systems.

Petroleum R&D budget authority is proposed at $23 million, or $4 million less than 1983, a 16-percent decrease. The goal of this program is to increase the production of oil from domestic sources by performing generic R&D in the techniques of recovering oil from existing and potential oil reservoirs as well as from nonconventional sources such as oil shale. The enhanced oil recovery program is the only petroleum R&D program to show an increase in 1984 -- 73 percent, to $11 million. This program conducts fundamental, long-term research into the behavior of light and heavy oil processes such as micellarpolymer or steam flooding. The oil shale program is developing the technology base needed to help industry overcome environmental and technological barriers to shale oil development, as well as obtaining environmental data on oil shale development impacts.

Gas R&D programs show a 69-percent, or $12 million, decrease to $5 million in 1984. The unconventional gas recovery program accounts for the entire gas R&D budget and has the goal of assisting the private sector to develop cost-effective diagnostic and extraction technologies required to produce gas efficiently and economically from the vast unconventional gas sources.

R&D budget authority for fossil energy
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$408	$307	$131
Coal	360	262	103
Coal technology and coal preparation	24	28	17
Advanced research and technology development	52	32	24
Coal liquefaction	98	38	17
Combustion systems	31	24	8
Fuel cells	34	30	10
Heat engines	15	5	1
Underground coal gasification	8	6	2
Magnetohydrodynamics	22	29	-
Mining R&D [a]	11	-	-
Surface coal gasification	54	39	17
Program direction	12	32	7
Petroleum	39	28	23
Advanced process technology	4	5	3
Enhanced oil recovery	15	7	11
Oil shale	18	12	9
Program direction	2	4	1
Gas	9	17	5
Unconventional gas recovery	9	14	5
Program direction	(b)	3	(b)

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[a] Public Law 97-257 transferred the coal mining R&D program to the Bureau of Mines in the Department of the Interior.

[b] Less than $500,000.

Energy conservation

Energy conservation R&D programs are scheduled to decline 54 percent, or $72 million, in 1984 to $62 million. This program conducts research in areas where new knowledge can expand the technology base underlying energy conservation efforts. An expanded technology base, coupled with price decontrols and normal market pressures, could accelerate applications of cost-effective energy-saving technologies. Reliance is placed on marketplace supply and demand for future technology development by the private sector. In keeping with this policy, all end-use-oriented projects, such as the larger share of buildings and community systems programs, have been phased out. The total in 1984 is $16 million, down $23 million, or 59 percent, from 1983.

Industrial R&D programs are scheduled to decrease 62 percent, or $17 million, to $11 million in 1984. The program is focused on high-risk development that private industry has insufficient incentive to pursue independently. Most activities are conducted by industrial firms or other private institutions operating under cost-shared contracts or cooperative agreements. The largest of the subprograms, waste energy reduction, would continue work toward improving combustion efficiency of industrial furnaces and boilers.

Transportation R&D program shows a 41-percent, or $22 million, decrease to $32 million in 1984. The objective is to perform R&D on vehicles and engines to increase fuel efficiency and allow a switch from petroleum to electricity and alternative fuels. Emphasis is on technology development in vehicle propulsion R&D programs maximum involvement by U.S. industry in solution of technology problems, and concentration on key technology barriers where high risks prohibit industry-only financing.

Multisector R&D programs show a proposed request of $3 million in 1984, or $10 million (76 percent) less than the $13 million in 1983. The goal is to solidify the technology base used by the private sector in designing and developing processes and equipment for transportation, buildings, and industrial energy use.

R&D budget authority for energy conservation
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$151	$134	$ 62
Buildings and community systems	47	39	16
Building systems	19	13	7
Residential conservation service ...	3	3	-
Community systems	4	4	-
Urban waste	5	3	-
Small business	-	-	-
Technology and consumer products ...	11	11	5
Appliance standards	2	1	2
Analysis and technology transfer ...	1	1	(a)
Federal energy management program ..	(a)	1	1
Program direction	3	3	2
Industrial	29	28	11
Waste energy reduction	12	12	7
Process efficiency	8	8	2
Implementation and deployment	2	2	(a)
Cogeneration	5	5	-
Program direction	2	2	1
Transportation	59	54	32
Vehicle propulsion R&D	34	35	16
Electric and hybrid vehicle R&D	19	14	10
Transportation systems utilization .	1	-	1
Alternative fuels utilization	4	2	4
Advanced materials development	-	2	2
Program direction	1	2	(a)
Multisector	16	13	3
Appropriate technology	3	2	-
Inventors program	5	2	-
Energy conversion and utilization technologies	8	9	3
Program direction	(a)	(a)	(a)

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[a] Less than $500,000.

Uranium enrichment

R&D budget authority for the uranium enrichment program is $132 million, or $11 million (9 percent), greater than 1983. The goal of this program is to meet domestic, foreign, and U.S. Government requirements for uranium enrichment services in the most economical, reliable, safe, and environmentally acceptable manner possible and to enhance the competitive position of the Nation in the international market. The uranium enrichment activities program is scheduled for a 4-percent, or $3 million, increase to $69 million to support analyses of uranium enrichment services supply and demand as well as to support gaseous diffusion operations.

Advanced isotope separation shows proposed R&D budget authority of $60 million in 1984, a 27-percent, or $13 million, increase over 1983. The goal of this program is to develop a technology that will provide for the production of enriched uranium at a significantly reduced cost. This technology, if successful, could be used to replace the power intensive gaseous diffusion plants.

R&D budget authority for uranium enrichment
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$156	$122	$132
Uranium enrichment activities	63	66	69
Advanced isotope separation technology ..	79	47	60
Uranium resources assessment	6	3	-
Program direction	7	6	4

Nuclear Regulatory Commission

The 1984 R&D budget authority request for the NRC Office of Nuclear Regulatory Commission Research is $200 million, or $10 million (5 percent), less than 1983. The NRC research program focuses on the development of a sound and complete base of technical information on basic safety issues. It provides an independently verified source of safety, health, and environmental information, coordinated with that supplied by applicants or licensees, as a basic for licensing and regulatory decisions.

Reactor and facility safety activities are scheduled for a 15-percent, or $15 million, increase in 1984 to $108 million. These programs provide a basis for evaluating reliability and safety margins of mechanical components and structures. Research also provides the NRC staff with a basis for evaluating and decommissioning facilities in a manner that protects public health and safety.

Within the reactor accidents program, accident evaluation and mitigation, is expected to decrease $4 million, or 8 percent, to $44 million. Research in this area would continue to provide the NCR with the technical bases for reducing uncertainties associated with present risk assessment studies and evaluating systems capabilities intended to improve light water reactor safety.

The LOCA (loss-of-coolant test) research program is expected to decrease $2 million, or 14 percent, to $11 million and would provide technical evidence for the NRC review of the Department of Energy's application for the Clinch River breeder reactor plant project.

The LOFT (loss-of-fluid test) experimental test facility program would terminate in 1983 but would continue to provide NRC with assessments regarding the accuracy of computer codes used to analyze accidents through FY 1983. NRC will continue to participate in the management board of the LOFT test program.

R&D budget authority for the Nuclear Regulatory Commission
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$220	$210	$200
Reactor and facility safety	92	94	108
Reactor and facility engineering	35	37	40
Facility operations	12	12	15
Thermal hydraulic transients	19	22	28
Siting and health	10	8	9
Risk analysis	16	14	18
Reactor accidents	92	76	55
Accident evaluation and mitigation	36	48	44
LOCA (loss-of-coolant accidents)	13	13	11
LOFT (loss-of-fluid test)[a]	43	15	-
Advanced reactors	8	9	10
Waste management	12	13	9
Program technical support	17	19	17

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[a] An international consortium formed in FY 1983 under the auspices of the Organization of Economic Cooperation and Development (OECD) has taken over the responsibility for the management and funding of the LOFT program.

Environmental Protection Agency

The energy R&D program under EPA is expected to decrease $1 million, or 6 percent, to $24 million in 1984. Research would be conducted to better understand the phenomena of acid deposition; enhance the agency's knowledge of the potential health and environmental effects of emerging energy technologies; characterize and evaluate synfuels discharges and expand EPA's knowledge of performance, reliability and cost of the limestone injection multistage burner (LIMB) technology. All energy R&D activities for 1984 and 1984 are expected to be performed under the multi-media energy research program.

R&D budget authority for the energy R&D program of the
Environmental Protection Agency
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$ 48	$ 25	$ 24
Multi-media energy	23	25	24
Acid rain	7	13	14
Technical information and liaison	(a)	-	-
Health effects	2	2	2
Environmental engineering and technology	9	10	7
Environmental processes and effects	5	(a)	-
Gases and particles energy	11	-	-
Environmental engineering and technology	7	-	-
Environmental processes and effects	4	-	-
Oxidants energy	10	-	-
Water quality energy	2	-	-
Industrial wastewater energy	1	-	-
Municipal spills energy	(a)	-	-

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[a] Less than $500,000.

SPACE RESEARCH AND TECHNOLOGY

The National Aeronautics and Space Administration (NASA) conducts all the R&D activity under the space function. R&D budget authority for space research and technology in 1984 is $1,897 million, 1 percent, or $14 million, above the 1983 level. Now that the space shuttle is in an operational phase, it is no longer appropriate to classify all of NASA programs as R&D. Therefore, the amounts shown for 1982, 1983, and 1984 for NASA research and development exclude funding for shuttle production and operation, tracking and data acquisition activities, and related institutional support. Major features of the 1984 plan for space research and technology are these:

- An increase in basic research support of $44 million, or 9 percent, to $529 million.
- A decrease of $52 million, or 16 percent, in space transportation systems, resulting from a decrease in shuttle-related research and program management funds and termination of the expendable launch vehicles program.
- A $109 million, or 12-percent, increase in space science, including $29 million to fund the Venus radar mapper, a new initiative for 1984.
- A $60 million, or 13-percent, decrease in space and terrestrial applications, chiefly related to decreases in the Landsat program and termination of AgRISTARS support.

The ratio of R&D budget authority to total budget authority for space research and technology is 29 percent in the 1984 budget.

R&D budget authority for space research and technology
[Dollars in millions]

	1982 actual	1983 estimate	1984 estimate
Total	$2,584	$1,883	$1,897
National Aeronautics and Space Administration	2,584	1,883	1,897
Space transportation systems	1,191	316	264
Space science, applications, and technology	1,379	1,552	1.617
Space science	748	873	981
Space and terrestrial applications	425	459	399
Space research and technology	195	218	237
Energy technology	11	3	-
Supporting activities (advanced systems)	14	16	16

Space transportation systems (STS)

R&D budget authority for the space transportation systems (STS) program is $264 million in 1984, or $52 million less than the 1983 program level. Capability development, which accounts for the entire program in 1984, will increase 19 percent to $180 million, but this increase is offset by decreases in operations and in research and program management related to the shuttle. Within capability development $142 million is provided for shuttle modifications and improvement and continued development of two versions of the Centaur upper stage. The Centaur is used to launch probes from the shuttle into interplanetary space and to lift communications satellites into orbit. The proposal also includes a tethered satellite program to extend the use of the shuttle to conduct scientific experiments in the boundary region between space and the Earth's upper atmosphere. The tethered satellite will be a cooperative effort with the Italian government.

NASA support of expendable launch vehicle (ELV) R&D efforts will cease after 1983. By 1984, ELV will be reimbursable by customers, and research and development of the Delta, the most widely used vehicle in NASA's ELV family, will have been completed.

R&D budget authority for space transportation systems
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$1,191	$316	$264
Capability development	911	151	180
Advanced programs	10	12	18
Design, development, test and evaluation	894	60	62
Performance augmentation	7	54	80
Changes and systems upgrading	-	25	20
Operations (expendable launch vehicles)	15	30	-
Research and program management	265	135	84

Space science

Proposed budget authority for space science R&D activities in 1984 is $981 million, 12 percent higher than the 1983 level. This represents more than one-half of the total space R&D budget authority for 1984. The objective of the space science program is to study the solar system and universe, using satellites in Earth orbit and spacecraft sent to planets and their moons, and to carry out life sciences research related to the space eniivironment. Major projects in 1984 include continued development of the space telescope, shuttle/spacelab payload, and the Galileo mission to Jupiter, advancement in the gamma ray observatory mission, and initiation of the Venus radar mapper mission.

R&D budget authority of $515 million proposed for physics and astronomy in 1984 is $74 million, or 17 percent, more than in 1983. Development of the space telescope will continue in preparation for a launch in 1985; most of the $17 million cut from the 1983 funding level for the telescope represents completion of some spacecraft components, design reviews on scientific instruments, and preliminary design review of the spacecraft. The $90 million development request for the gamma ray observatory is $55 million above the 1983 level. This observatory, an aid to research in high energy astrophysics, is scheduled for orbit in 1988. Spacecraft and scientific instrument fabrication will begin in 1984. The Explorer development program is scheduled for a $14 million, or 42-percent, increase in 1984 to $49 million. More than one-half of this increase will fund development of the Active Magnetospheric Particle Tracer Explorer, a cooperative project with the Federal Republic of Germany to study solar wind, to identify particle entry windows, and to study energization and transport processes into the magnetosphere.

Proposed R&D budget authority for planetary exploration in 1984 is $205 million, or 10 percent, above the 1983 level. This program includes the scientific exploration of the solar system with the objective of understanding its origin and evolution. The Galileo mission, scheduled for a launch to Jupiter in 1986, will continue development of ground systems to support operation of the spacecraft. Reduced funding in 1984 involves completion of the orbiter subsystems and integration of the probe and orbiter. The Venus radar mapper mission, a new initiative in 1984, will focus on fundamental questions regarding the origin and evolution of Venus by obtaining global radar imagery of the planet.

Life sciences support is scheduled to increase 6 percent to $59 million. This program is developing a capability to sustain a permanent manned presence in space, utilizing the space environment to study living systems. Efforts include both ground-based and space research programs that are mutually supportive and integrated and that use a composite of disciplines and techniques in both biology and medicine to address space-related medical problems and fundamental biological processes.

R&D budget authority for space science
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$748	$873	$981
Physics and astronomy	322	441	515
Space telescope development	122	138	121
Gamma ray observatory development	8	35	90
Shuttle/spacelab payload development and mission management	48	83	93
Explorer development	33	34	49
Mission operations and data analysis	45	75	80
Research and analysis	23	29	30
Suborbital programs	44	48	53
Planetary exploration	210	186	205
Galileo development	116	92	80
Venus radar mapper mission	-	-	29
International solar polar misssion	5	6	8
Mission operations and data analysis	43	39	43
Research and analysis	47	50	46
Life sciences	40	56	59
Life sciences and flight experiments	14	24	23
Research and analysis	16	32	36
Research and program management	176	190	202

Space and terrestrial applications

Programs under this heading use space, aircraft, and ground-based systems to identify useful applications of space techniques in advanced communications satellite systems technology, materials processing research, and remote sensing to assist in solving Earth resources and environmental problems. The $399 million proposed for these programs in 1984 is $57 million, or 13 percent, below the prior-year support.

The solid earth observations program reflects a decrease of $58 million from 1983 to $74 million in 1984. This program develops and applies space observation techniques to management of food, fiber, water, and land resources; improves our ability to evaluate the composition and geometry of the Earth's energy and mineral resources; and aids our understanding of the Earth's geodynamics.

The largest cut is made in the Landsat 4 program, down $46 million to $16 million. This results from completion of the Landsat-D prime spacecraft during 1983. The 1984 funds will be used to support Landsat ground systems and operations. AgRISTARS research will be completed by NASA in 1983, but the remote sensing capability will remain in place to provide the U.S. Departments of Agriculture and Commerce with data on world agricultural production and the operation of U.S. agricultural markets. The geodynamics program shows a $2 million increase.

The environmental observations program shows a 1984 budget request of $163 million, 4 percent more than in 1983. The objectives of this program are an improved understanding of the atmosphere and oceans, and improved capability to predict environmental phenomena and their interaction with human activities. A $5 million reduction to $1 million for the operational satellite improvement program reflects transfer to the National Oceanic and Atmospheric Administration (Commerce) of responsibility for defining and funding specific systems improvements required for weather and environmental operational missions. A $9 million decrease for the Earth radiation budget experiment (ERBE) to $16 million reflects scheduled delivery of flight hardware in 1983. ERBE measures the temporal and spatial variations in the radiation balance over the globe, providing insight into climatic fluctuations. The upper atmosphere research satellite (UARS) experiments and mission definition project is scheduled for the largest increase--$6 million. The UARS mission will conduct research, develop technology, and monitor the upper atmosphere to improve basic scientific understanding. The mission is slated for a late 1980's launch, and the increased support in 1984 will be applied to instrument design.

The materials processing in space program is concerned with the science and technology of processing materials under constraints imposed by gravitational forces and discovering the unique capabilities made possible by controlling these processes in a space environment. Support of this activity will continue at the same level in 1984 as in 1983.

R&D budget authority for space and terrestrial applications
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$425	$459	$399
Solid earth observations	149	132	74
Landsat 4	82	62	16
Extended mission operations	3	2	1
Shuttle/spacelab payload development	12	14	15
Geodynamics	23	26	28
AgRISTARS	14	15	-
Research and data analyses	16	14	15
Environmental observations	133	157	163
Upper atmosphere research program	21	28	30
Oceanic processes research and data analysis	17	17	18
Shuttle/spacelab payload development	4	4	8
Operational satellite improvement program	6	6	1
Earth radiation budget experiment	24	24	16
Halogen occulation experiment	5	-	-
Extended mission operations	16	23	27
Space physics	12	15	16
Atmospheric dynamics and radiation research and analyses	22	27	28
UAR satellite experiments and mission definition	6	14	20
Materials processing in space	16	22	22
Communications and information systems	26	40	30
Research and program management	101	108	110

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[a] Less than $500,000.

Communications and information systems, at $30 million in 1984, will be 25 percent below the 1983 support level. The $10 million decrease is chiefly caused by a reduction in the advanced communications technology satellite (ACTS) program. The ACTS program required high start-up funding in 1983. The 1984 request of $5 million will be used for design and development activities.

Space research and technology

The NASA space research and technology program provides a base of proven technology supporting future national programs in the conception and design of advanced spacecraft; develops a technology foundation for improving low-cost access to space through shuttle enhancements and orbital transfer concepts; supports activities related to a permanent human presence in space; and supports projected long-term needs of military and commercial use of space. The 1984 proposed budget authority of $237 million is $19 million, or 9 percent, more than the 1983 level. The increase would be spread across the spectrum of research and technology base projects. Platform systems would receive the largest increase, up $7 million to $12 million in 1984, reflecting emphasis on developing a research and technology capability for future manned and unmanned large space platforms.

R&D budget authority for space research and technology
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$195	$218	$237
Research and technology base	105	115	127
Fluid and thermal physics	8	9	9
Materials and structures	15	15	16
Computer science and electronics	14	16	16
Space energy conversion	18	17	18
Multidisciplinary	2	2	1
Controls and human factors	3	7	8
Space data and communication	17	18	19
Chemical propulsion	13	15	16
Spacecraft systems	5	4	4
Transportation systems	7	8	8
Platform systems	3	5	12
Systems technology program	3	5	7
Standards and practices	3	3	5
Research and program management	84	95	99

GENERAL SCIENCE

This function consists of National Science Foundation (NSF) programs and two programs of the Department of Energy. The programs that fall within this function are viewed as contributing to the Nation's scientific base in an even broader sense than the basic research that supports agency missions.

R&D budget authority for 1984 general science programs increases 15 percent over the 1983 level of $1,492 million for a total of $1,720 million. The key elements of the general science function are as follows:

- An increase of 17 percent above the 1983 level for NSF programs, to a total of $1,240 million in 1984.
- An increase in NSF basic research of 19 percent to $1,181 million in 1984.
- An increase of $64 million in NSF mathematical and physical sciences programs, or 21 percent above the 1983 level.
- An increase of $59 million in NSF astronomical, atmospheric, earth and ocean sciences programs, or 21 percent above the 1983 level.
- An increase of $33 million in NSF biological, behavioral, and social sciences programs, or 17 percent above the 1983 level.
- An increase of $22 million in engineering R&D, or 21 percent over 1983.
- An increase in DOE general science programs of 10 percent over 1983 to a total of $480 million.

Budget authority for general science R&D as a share of total general science budget authority in 1984 is 91 percent. Virtually all of the activities within the general science function are research or development with the remainder consisting of R&D plant and some NSF information collection activities. Of the R&D total, 97 percent consists of basic research.

R&D budget authority for general science
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$1,359	$1,492	$1,720
National Science Foundation	976	1,057	1,240
Mathematical and physical sciences	278	306	370
Astronomical, atmospheric, earth and ocean sciences	267	283	342
Biological, behavioral, and social sciences	183	197	230
Engineering	97	105	127
U.S. Antarctic program	67	81	94
Science and engineering education	3	-	-
Scientific, technological, and international affairs	44	49	40
Special foreign currency	4	2	3
Program development and management	33	33	34
Undistributed	-	4	-
Adjustments for deferrals and carryovers	4	3	-
Department of Energy	383	435	480
High energy physics	269	320	350
Nuclear physics	112	112	128
General science program direction	2	2	2

National Science Foundation

The mathematical and physical sciences (MPS) budget authority proposed for 1984 is 21 percent, or $64 million, above the 1983 level. Growth in budget authority is evenly distributed across all of the MPS disciplines. In mathematics, emphasis is placed on the support of graduate students and postdoctoral researchers, while programs in computer research continue support for experimental and theoretical activities. Physics programs emphasize support for new instrumentation, particularly for user groups preparing experiments for the new Tevatron accelerator at Fermilab, improved computing capabilities, and increased support for postdoctoral scientists and graduate research assistants. Chemistry research continues to focus on areas presenting significant promise for rapid advancement and on increased support for research instrumentation. In materials research, instrumentation and student support are also emphasized, and modest relative attention is given to solid state chemistry, condensed matter theory and polymers.

R&D budget authority for mathematical and physical sciences
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$278	$306	$370
Mathematical sciences	30	35	42
Computer research	26	29	35
Physics	75	89	108
Chemistry	61	66	80
Materials research	80	81	100
Program development and management	5	6	6

The astronomical, atmospheric, earth and ocean sciences (AAEO) activity is proposed for an increase of 21 percent—$59 million higher than in 1983. Support for astronomical sciences, up 25 percent or $16 million, provides funds for university research project support grants and for five National Astronomy Centers. Astronomy project support in the 1984 budget emphasizes astronomical instrumentation and detectors, theoretical astrophysics, digital detectors for telescopes, and accelerated development of a 10-meter, submillimeter-wave telescope. In addition, support is sought for work in infared astronomy, ground-based observatories, and studies related to the return of Comet Halley. The five National Astronomy Centers provide a variety of optical, infared, radio, and other specialized instrumentation, on a competitive basis, to scientists throughout the nation and abroad.

Atmospheric sciences are also scheduled to grow 21 percent in 1984--a $16 million increase. Priority in atmospheric sciences project support is given to atmospheric chemistry research, studies of mesoscale phenomena, and climate studies emphasizing the interaction between the atmosphere and the oceans. The other major component of the atmospheric sciences activity, the National Center for Atmospheric Research (NCAR), emphasizes development of a prototype interactive coupling network to link universities to NCAR's data bases and computing capabilities and the acquisition of a mass storage system for use at their computing facility.

The earth sciences program grows 24 percent, or $8 million, in the 1984 budget. In addition to proposing increases in areas where equipment needs are critical, research areas to be emphasized include geologic research on the structure and evolution of the U.S. continental crust, plate motions, earthquakes, hydrothermal and magnetic systems, and large-scale crustal faulting. Also, support is proposed for research on ancient asteroid impacts and their possible influence on the mass extinctions of life forms as seen in the fossil record, the tectonic and thermal history of sedimentary basins, and the structures and properties of rocks and minerals at the pressures and temperatures of earth's interior.

Ocean sciences are scheduled for growth of 10 percent, or $8 million in 1984. In the area of ocean sciences research, considerable attention is given to instrumentation improvements in all areas supported.

R&D budget authority for astronomical, atmospheric, earth, and ocean sciences
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$267	$283	$342
Astronomical sciences	59	63	79
Astronomy project support	20	21	28
National Astronomy and Ionosphere Center	5	5	6
Kitt Peak National Observatory and Cerro Tololo Inter-American Observatory	17	19	22
National Radio Astronomy Observatory	15	16	21
Sacramento Peak Observatory	2	2	3
Atmospheric sciences	70	75	91
Atmospheric sciences project support	39	42	50
National Center for Atmospheric Research	30	33	41
National scientific balloon facility	2	-	-
Earth sciences	29	34	42
Ocean sciences	75	81	89
Ocean sciences research	47	50	56
Oceanographic facilities and support	28	31	33
Ocean drilling	20	17	26
Arctic research	6	6	8
Program development and management	7	7	7

R&D budget authority for the biological, behavioral, and social sciences (BBS) program activities is expected to grow 17 percent in the 1984 budget, or an increase of $33 million. Physiology, cellular and molecular biology, the largest of the BBS activities, increases 20 percent or $17 million and emphasizes support for instrumentation, plant biology, and genetics. The biotic systems and resources activity area is scheduled for growth of 17 percent, or $8 million. The increase proposed emphasizes plant biology and support for innovative research areas such as transformations of biogenic elements, as well as funds for research equipment. The behavioral and neural sciences activity grows 12 percent, or $4 million, with special attention given to research in neurosciences. Social and economic sciences are proposed to increase 15 percent, or $3 million, with most of the added support intended to enhance cumulative data resources on economic, political, and social change.

R&D budget authority for biological, behavioral, and social sciences
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$183	$197	$230
Physiology, cellular and molecular biology..	80	86	103
Biotic systems and resources	42	46	54
Behavioral and neural sciences	32	34	38
Social and economic sciences	18	20	23
Information science and technology	5	5	6
Program development and management	6	6	6

The engineering program shows increased support of 21 percent, or $22 million, in 1984 budget authority. Electrical, computer and systems engineering activities, proposed for growth of 28 percent, emphasize sensors and computers for advanced robotics, microstructure technology for improved materials, optical devices and systems for communications, large scale systems for automated manufacturing, and efforts to aid the motor and sensory impaired person. Chemical process engineering, with a 23 percent increase, focuses on photocatalysis, biochemical processes, lignocellulosic conversion and separation processes. Civil and environmental engineering is scheduled to grow 13 percent while mechanical engineering and applied mechanics is proposed for a 32-percent increase to accomodate expanded equipment funding and young investigator support, and research areas such as robotics/automated manufacturing, and thermal systems.

R&D budget authority for engineering
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$ 97	$105	$127
Electrical, computer, and systems engineering	26	29	37
Chemical and process engineering	20	22	27
Civil and environmental engineering	30	30	34
Mechanical engineering and applied mechanics	17	19	25
Program development and management	4	4	4

The U.S. Antarctic Program is proposed to increase 16 percent, or $13 million, with most of these funds programmed for operations support. The research program grows 11 percent, or $1 million, with emphasis on magnetosphere-ionosphere interactions, the Antarctic marine ecosystem, study of the history, structure and tectonics of the Transantarctic mountains, deep ice drilling and the first phase of a study of polar front dynamics in the southern oceans.

R&D budget authority for U.S. Antarctic program
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$ 67	$ 81	$ 94
U.S. Antarctic research program	8	9	10
Operations support program	59	72	84
Program development and management	-	-	-

Research activities within scientific, technological and international affairs (STIA) fall 18 percent in the 1984 budget--a decline of $9 million. The largest activity, industrial science and technological innovation, grows 14 percent, or $2 million. Its primary objectives are to support cooperative research efforts between universities and industry, and research in small high technology businesses. International cooperative scientific activities fall 50 percent, or $5 million. This decline reflects the Foundation's new philosophy and management practice of integrating support for international cooperative research into the mainstream of NSF discipline-oriented research, while continuing to coordinate and manage bilateral agreements, seminars, workshops, and scientific visits, and facilitate support of cooperative research projects within NSF.

R&D budget authority for scientific, technological, and international affairs
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$ 44	$ 49	$ 40
Industrial science and technological innovation	13	14	16
International cooperative scientific activities	11	10	5
Policy research and analysis	4	4	5
Science resources studies	1	1	1
Research initiation and improvement	7	11	6
Program development and management	8	9	9

Department of Energy

General science programs of the Department of Energy (DOE) are proposed for growth of 10 percent, or $45 million, in the 1984 budget, reaching a total of $480 million.

High energy physics, the largest activity in the DOE general science program, receives a 9-percent increase in the 1984 budget--$30 million above the 1983 level, for a total of $350 million. A major feature of the program proposed for 1984 is the first full year of operation of the Energy Saver superconducting synchrotron at Fermilab for research in the 500-100 GeV energy range. Priority is also given to operation and research utilization of the PEP facility. The budget also requests funds to continue progress on the Tevatron I and Tevatron II construction projects at Fermilab and to initiate construction of the SLAC Linear Collider (SLC) on a rapid schedule. At Brookhaven National Laboratory work would continue toward development of large aperture accelerator quality superconducting magnets.

Budget authority for nuclear physics is scheduled for growth of 14 percent, or $16 million, reaching a total of $128 million. Emphasis in this program would be given to research utilizing recently completed facilities which make possible the acceleration of ions as heavy as uranium to low energies in the SuperHILAC, and to high energies in the Bevalac (Lawrence Berkeley Laboratory); use of the Bates Electron Accelerator recirculator project (MIT), which provides electron beams for precision electron-nuclear scattering studies at higher energies than previously available; and use of newly available heavy ion beams at the Holifield Heavy Ion Research Facility (Oak Ridge National Laboratory) and the Argonne Tandem/Linac (Argonne National Laboratory), which will allow high precision heavy ion physics studies at higher energies than previously available.

R&D budget authority for the general science programs of the Department of Energy
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$383	$435	$480
High energy physics	269	320	350
Physics research	78	92	102
Facility operations	124	152	166
High energy physics technology	67	76	82
Nuclear physics	112	112	128
Medium energy nuclear physics	51	52	59
Heavy ion nuclear physics	42	40	47
Low energy nuclear physics	12	12	13
Nuclear theory	8	8	9
General science program direction	2	2	2

Basic Research: All Functions

The 1984 budget proposes growth of 9 percent for basic research, an increase of $506 million for a total of $6,401 million. Of the major functions, all but health and natural resources and environment are scheduled for increases ahead of the anticipated inflation rate.

The general science function, which accounts for more than one-fourth of all Federal basic research, increases 16 percent in proposed 1984 budget authority, or $231 million, reaching $1,661 million. NSF basic research programs show the largest planned growth, advancing 19 percent, or $186 million, to $1,181 million. DOE budget authority for basic research would grow 10 percent--$45 million--reaching $480 million.

The health function, accounting for more than one-third of all Federal basic research, would grow 3 percent in 1984 budget authority, or $55 million, for a total of $2,238. The National Institutes of Health provide approximately 90 percent of Federal health basic research funding.

National defense basic research activities are anticipated to increase 10 percent in 1984, growing $81 million to a total of $869 million. Basic research in defense accounts for 14 percent of all Federal basic research in the 1984 budget, all of it conducted within the DOD technology base mission area.

The space research and technology area is expected to increase support for basic research by 9 percent or $44 million, reaching a total of $529 million. Most of the NASA basic research effort is in space science programs relating to physics and astronomy and planetary exploration.

The agriculture function shows a proposed increase of 6 percent, growing $18 million and reaching $343 in the 1984 budget. Most of this growth is related to basic research programs of the Agricultural Research Service (USDA).

The energy function is scheduled for growth in basic research of 13 percent--$36 million, reaching $322 million in the 1984 budget. Programs of DOE in basic energy sciences are primarily responsible for this growth.

The transportation function, comprised mainly of the NASA aeronautical basic research program, is scheduled for growth of 28 percent in the 1984 budget, to $153 million.

Natural resources and environment is proposed to receive the smallest increase for basic research of any of the major functions, increasing less than 1 percent--$1 million above the 1983 level for a total of $145 million. The Forest Service (USDA) and Bureau of Mines (Interior) are scheduled to receive increases in basic research support in 1984.

The remaining functions account for only 2 percent of all Federal basic research budget authority in 1984.

Budget authority for basic research by function
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$5,305	$5,895	$6,401
General science	1,296	1,430	1,661
National Science Foundation	913	995	1,181
Department of Energy	383	435	480
All other functions	4,009	4,465	4,740
Health	1,953	2,183	2,238
National defense	696	788	869
Space research and technology	434	485	529
Agriculture	295	325	343
Energy	260	286	322
Transportation	102	120	153
Natural resources and environment	139	144	145
Education, training, employment, and social services	78	80	88
Commerce and housing credit	17	18	17
Veterans benefits and services	13	15	15
International affairs	10	10	10
Community and regional development	7	5	6
General government	2	3	4
Administration of justice	4	4	2
Income security	-	-	-

TRANSPORTATION

The budget authority request for transportation R&D activities in 1984 is $1,091 million, 22 percent greater than the 1983 level. This function is comprised of subdivisions of the Department of Transportation (DOT) and the aeronautical research and technology program of the National Aeronautics and Space Administration (NASA). Highlights of 1984 changes in R&D support are as follows:

- An increase of 28 percent, to $153 million, in budget authority for basic research, represented chiefly by the NASA aeronautical research and technology program.
- An increase of 30 percent in air transportation R&D programs, mostly from an increase in the Federal Aviation Administration advanced computer program.

R&D budget authority for transportation as a share of total budget authority for this function is approximately 4 percent in the 1984 budget.

R&D budget authority for transportation
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$791	$894	$1,091
Ground transportation	167	179	174
Federal Highway Administration (DOT)	43	51	55
National Highway Traffic Safety Administration (DOT)	55	54	57
Federal Railroad Administration (DOT)	18	17	17
Urban Mass Transportation Adm.	51	57	46
Air transportation	591	668	869
Federal Aviation Adm. (DOT)	97	135	304
Air traffic control	47	49	78
Advanced computer	11	40	157
Navigation	8	5	11
Aviation weather	5	8	14
Aviation medicine	3	3	6
Aircraft safety	5	11	18
Environment	1	2	2
Operations development	18	17	18
Aeronautical research and technology (NASA)	494	533	565
Research and technology base	173	198	228
Fluid and thermal physics	39	43	52
Materials and structures	22	25	28
Controls and guidance	7	12	13
Human factors	8	10	11
Multidisciplinary	8	4	4
Computer science and applications	9	19	21
Propulsion systems	19	17	29
Rotorcraft	20	23	23
High-performance aircraft	29	38	39
Subsonic aircraft	14	8	9
Systems technology programs	92	82	73
Rotorcraft	22	22	28
High-performance	14	15	20
Subsonic aircraft	27	17	5
Advanced propulsion	26	28	-
Numerical aerodynamic similation	-	-	20
Materials and structures	2	-	-
Propulsion systems	1	-	-
Avionics and flight control	1	-	-
Research and program management	229	253	265
Water transportation	28	37	35
Maritime Administration (DOT)	10	17	13
Coast Guard (DOT)	18	20	22
Other transportation	6	11	12
Office of the Secretary (DOT)	3	5	7
Research and Special Programs Administration (DOT)	2	6	5

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Ground transportation

Ground transportation R&D support is expected to decrease approximately 2 percent in 1984, to $174 million. Small increases in R&D programs of the Federal Highway Administration (DOT) and the National Highway Traffic Safety Administration (DOT) are more than offset by a $12 million decrease in Urban Mass Transportation Administration (DOT) R&D programs.

Air transportation

In 1984, air transportation R&D support is expected to increase $201 million, or 30 percent, over 1983, to $869 million. The Federal Aviation Administration (DOT) accounts for $169 million of the increase, with all R&D programs receiving higher funding levels in 1984 than in 1983. Most of the increase, however, $117 million, is for development of an advanced computer system designed to increase the safety of air travel.

The NASA aeronautical research and technology program is scheduled for a 6-percent increase in 1984, to $565 million. The $30 million increase for research and technology base reflects increases for all ongoing efforts in aeronautical disciplines and vehicle-oriented programs. Systems technology activities support scheduled for an overall $10 million decrease, would increase support of programs that have strong interdependence with DOD aeronautical research programs--rotorcraft systems technology and high-performance aircraft systems technology--while decreasing R&D efforts on subsonic aircraft systems and eliminating advanced propulsion systems efforts. Numerical aerodynamic simulation is a new $20 million initiative in 1984.

Water transportation

Water transportation R&D activities are expected to decrease $2 million. A $4 million lower funding level for the Maritime Administration (DOT) is partially offset by a $2 million increase in Coast Guard (DOT) programs.

NATURAL RESOURCES AND ENVIRONMENT

R&D budget authority for natural resources and environment is proposed at $788 million in 1984, a decrease of $138 million, or 15 percent below the 1983 level. Major aspects of the proposed program for 1984 include the following:

- Almost level funding of basic research in 1984 from 1983 for a total of $145 million.
- A 4-percent reduction in conservation and land management, resulting from reduced support to Forest Service R&D programs.
- A 4-percent decrease in recreational resources from reductions in Fish and Wildlife Service programs.
- An 11-percent decline for pollution and abatement programs of the Environmental Protection Agency to $182 million.
- A 35-percent reduction in support for the National Oceanic and Atmospheric Administration to a total of $142 million.

R&D budget authority for natural resources and environment as a share of total Federal budget authority for this function is estimated at 9 percent in 1984.

R&D budget authority for natural resources and environment
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$965	$927	$788
Water resources	50	40	40
Bureau of Reclamation (Int)	10	10	10
Office of Water Research and Technology (Int)	11	-	-
Corps of Engineers (DOD)	29	31	30
Conservation and land management	119	114	109
Forest Service (USDA)	112	105	101
Bureau of Land Management (Int)	5	7	7
Office of Surface Mining and Reclamation (Int)	2	2	2
Recreational resources	112	114	109
Fish and Wildlife Service (Int)	99	100	94
National Park Service (Int)	12	14	15
Pollution control and abatement	222	204	182
Environmental Protection Agency	222	204	182
Other natural resources	462	456	348
National Oceanic and Atmospheric Administration (Commerce)	221	219	142
Geological Survey (Int)	149	150	136
Bureau of Mines (Int)	92	86	68
Minerals Management Services (Int)	-	-	2

Water resources

The 1984 budget request for water resources R&D activities is $40 million, the same as 1983. The Office of Water Research and Technology (Interior) was eliminated in 1983. Programs of the Bureau of Reclamation (Interior) and the Army Corps of Engineers are expected to remain at the 1983 levels in 1984.

Conservation and land management

The $109 million proposed for this subfunction in 1984 is $5 million, or 4 percent, below the 1983 level. The Forest Service accounts for almost all of the decrease in this subfunction, with most of the decrease occurring in land and resource protection research.

R&D budget authority for the Forest Service (USDA)
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$112	$105	$101
Land and resource protection research ...	50	48	45
Fire and atmospheric sciences	9	8	7
Forest insects and disease	21	21	20
Renewable resources evaluation	13	12	11
Renewable resources economics	5	5	4
Surface environment and mining	2	2	1
Renewable resources management and utilization research	62	57	56
Trees and timber management	21	20	18
Forest watershed management	10	9	8
Wildlife, range, and fish habitat	9	8	8
Forest recreation	2	2	2
Forest products utilization	17	15	15
Forest engineering	3	3	3

Recreational Resources

The 1984 budget request for R&D efforts within recreational resources is $109 million, a decrease of $4 million from the 1983 level. The U.S. Fish and Wildlife Service (Interior), which conducts approximately 85 percent of the R&D activities within this subfunction, would receive $6 million less in 1984 than in 1983. Increases in Federal grants-in-aid to support State-conducted research activities on fish and wildlife restoration are negated by decreased funding for habitat and species preservation support.

The National Park Service (Interior) R&D request in 1984 is $15 million, $2 million more than in 1983. It would support continued research programs in archeology and social sciences.

R&D budget authority for the Fish and Wildlife Service (Interior)
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$99	$100	$94
Resources management	44	47	32
Habitat preservation	15	17	10
Wildlife resources	14	14	10
Fishery resources	13	13	9
Endangered species	3	3	3
Federal aid, fish restoration	18	20	24
Federal aid, wildlife restoration	36	33	38

Pollution control and abatement

All programs under this subfunction are conducted by the Environmental Protection Agency. The $182 million proposed R&D budget authority for 1984 is $22 million, or 11 percent, lower than the 1983 level. Reductions in all major programs except the interdisciplinary program reflect completion of major research to support regulatory decisions and reductions for development of pollution control technologies. Program emphasis would focus on quality assurance to improve the reliability of scientific data used and basic research.

The air quality research program would be reduced from 1983 levels by $8 million to $51 million. Research would focus on the development of comprehensive health risk assessments for hazardous air pollutants, organic pollutants monitoring methods, and improved air quality dispersion models.

Water quality research would receive the largest decrease of the EPA non-energy R&D programs, from $31 million in 1983 to $19 million in 1984--a 37-percent decline. Research under this program would emphasize ocean dumping and water-quality-based pollution control requirements, wastewater treatment technologies, and sludge management techniques.

Drinking water research activities would require $21 million, 10 percent less than 1983, for risk assessment, health research, monitoring, and groundwater transport research.

Hazardous waste research funding would decrease 17 percent to $27 million in 1984. Efforts on land disposal of hazardous wastes and on hazardous waste facilities would be supported.

The interdisciplinary research program is the only pollution abatement R&D program scheduled for an increase in 1984. R&D budget authority of $18 million, almost three times the 1983 level, would support the agency's research centers, long-term research grants, and development of economic benefits methods.

Toxic substances research and development would decrease $3 million to $24 million. This program would increase development of health risk assessment models, but the increase is offset by termination of funding, reflecting completion of a major monitoring study and completion of engineering technical support for the review of chemicals.

R&D budget authority for the Environmental Protection Agency[a]
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$222	$204	$182
Programs funded by the EPA R&D and S&E appropriations[a]	222	204	182
Air quality	56	59	51
Oxidants	14	13	12
Hazardous pollutants	9	9	10
Mobile sources	7	6	3
Gases and particles	15	32	26
Water quality	48	31	19
Water quality research	19	15	12
Municipal wastewater	17	11	5
Industrial wastewater	11	5	2
Drinking water	26	23	21
Hazardous waste	25	33	27
Pesticides	7	7	6
Radiation	2	2	2
Interdisciplinary	6	7	18
Toxic substances	30	27	24
Management and support	8	9	9
Program funded under the abatement control and compliance appropriation	14	6	6
Hazardous substance response trust fund	(b)	(b)	-

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[a] Excludes energy-related R&D programs.
[b] Less than $500,000.

Other natural resources

Except for one new initiative, the agencies in this group would receive reduced R&D funding under the proposed 1984 budget so that as a total, the requested budget authority of $348 million is $108 million, or 24 percent, less than the 1983 level.

The National Oceanic and Atmospheric Administration (Commerce) decrease of $77 million reflects reduced support in applied areas of research deemed more appropriately supported by the private sector or by State and local governments. Cuts in such programs as sea grants, marine pollution activities, fishing service resource information research and development, fishery grants to States, and closing of the Great Lakes Environmental Research Laboratory are examples of this policy.

Geological Survey (Interior) R&D programs are expected to decrease $14 million, or 10 percent, to $136 million in 1984, reflecting an overall reduction in survey programs. Most of the cuts would be in earthquake and geologic hazards research. A $5 million increase for mineral resources investigations, and small increases in geologic framework and offshore geologic surveys research only partially offset declines or level funding in all other R&D areas of the agency.

The Bureau of Mines (Interior) would receive $68 million for 1984 R&D activities. While basic research into mineral extraction and processing and new mineral sources would be increased, applied research into methods of extraction and processing and development projects of demonstration and testing would decrease.

The Minerals Management Service (Interior) is a new initiative for 1984, and would be funded at $2 million. Its mission is to provide research as a comprehensive technological base for oil and gas operations on the Outer Continential Shelf.

R&D budget authority for the National Oceanic and Atmospheric Admin. (Commerce)
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$221	$219	$142
Operations, research and facilities	207	211	142
Ocean and coastal programs	64	61	30
Marine fishery resources programs	42	47	27
Atmospheric programs	63	63	56
Satellite and environmental data and information services	8	10	10
Program support	30	31	21
Fishery products promotion and development (Saltonstall-Kennedy Act)	14	8	-

R&D budget authority for the Geological Survey (Interior)
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$149[a]	$150	$136
Mapping and geographic surveys	8	9	6
Research on mapping technology	4	6	4
Research on land use mapping techniques and analysis	1	1	1
Research related to the airborne positioning system	3	2	1
Geologic and mineral resources surveys and mapping	112	115	106
Earthquake hazards reduction	24	26	21
Other geologic hazards	14	15	10
Geologic framework	11	12	13
Geomagnetism	2	2	2
Other land resources	1	1	(b)
Mineral resources investigations	25	27	32
Coal investigations	8	8	6
Onshore oil and gas and oil shale research investigations	6	5	4
Uranium/thorium research investigations	4	3	2
Geothermal investigations	4	4	3
World energy resource assessment	1	1	-
Offshore geologic surveys	12	11	12
Water resources investigations	25	26	23
Earth sciences applications[c]	4	-	-
Digital cartography	-	-	1

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a/ Excludes $1,646 thousand for National Petroleum Reserve in Alaska in carryover funds from previous years, and $1,677 thousand for the Minerals Management Service.

b/ Less than $500 thousand.

c/ Funding for the earth sciences applications activity in 1983 and 1984 is included in other Geological Survey programs.

AGRICULTURE

All R&D activity within this function is conducted by the Department of Agriculture (USDA). Agriculture R&D budget authority in 1984 is expected to increase only $2 million over the 1983 level to $748 million, an increase of less than 1 percent. This reflects a policy of continuing to emphasize and fund only high-priority research projects essential to consumer and agricultural demands and not likely to be otherwise funded. The special areas of emphasis for 1984 include the following:

- An increase of 2 percent over 1983, to $89 million in animal production research.
- An increase of 2 percent, to $185 million, in plant production efficiency research.
- An increase of 3 percent, to $91 million, in research on processing, storage, distribution, food safety, and consumer services research.
- An increase of 26 percent, to $22 million, in competitive research grants, including $5 million in new appropriations to perform animal science research.
- A decrease of 43 percent, to $16 million, in special research grants.
- An increase of 15 percent, to $45 million, in Economic Research Service activities.

R&D budget authority for agriculture as a share of total budget authority for this function is 6 percent in 1984.

R&D budget authority for agriculture
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$693	$747	$748
Agricultural Research Service (USDA)	412	447	458
Animal production	80	87	89
Animal production efficiency research	79	86	88
Research on housing	1	1	1
Plant production efficiency research	167	180	185
Use and improvement of soil, water, and air	54	63	64
Research on conservation and use of land and water resources and maintaining environmental quality	40	47	47
Research on watershed development	14	17	17
Processing, storage, distribution, food safety, and consumer services research	85	88	91
Processing, storage, and distribution efficiency research	59	62	65
Research to improve human health and safety	26	25	26
Research on consumer services	1	1	1
Human nutrition research	26	28	29
Cooperative State Research Service (USDA)	221	235	222
Payments under the Hatch Act	141	149	149
Cooperative forestry research	12	13	13
Payments to 1980 colleges and Tuskegee Institute	21	22	22
Special research grants	23	28	16
Competitive research grants	17	17	22
Plant science	14	15	15
Human nutrition	3	2	2
Animal science	-	-	5
Animal health and disease research	6	6	-
Administration	1	(a)	1
Economic Research Service (USDA)	39	39	45
Statistical Reporting Service (USDA)	7	8	8
Human Nutrition Information Service (USDA)	9	8	7
Office of International Cooperation and Development (USDA)	(a)	6	6
Agricultural Cooperative Service (USDA)	2	2	2
Office of Transportation (USDA)	1	1	1
Agricultural Marketing Service (USDA)	2	2	-

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[a] Less than $500,000

Agricultural Research Service

A net increase in 1984 of $12 million, or 3 percent, to $458 million is proposed for the Agricultural Research Service (ARS). The mission of ARS is to plan, develop, and implement research that is designed to produce the new knowledge and technologies required to assure the continuing vitality of the Nation's food and agriculture enterprise. ARS conducts basic and applied research in the fields of livestock and plant science; pest control; use and improvement of soil, water and air resources; processing, safety and use of agricultural products; and research on human nutrition.

A proposed $2 million, or 2-percent increase to $89 million, in animal production research would continue studies of the efficiency of producing healthy animals and safe, high-quality animal products by improving their genetic and reproductive capacities.

An increase of $4 million, or 2 percent, to $185 million, in plant production research would expand support of bioregulation of basic processes, such as photosynthesis, nitrogen fixation, stress tolerance, seed germination, and the host-plant resistance to many crop pests. It would continue basic research to improve germplasm populations.

A $1 million, or 2 percent, increase to $64 million in the use and improvement of soil, water, and air research would continue basic research for evaluating the effect of erosion on soil productivity, and understanding the mechanisms involved in nonpoint source pollution. Additional support would be focused on the development of farm management systems that provide the farmer and land use planner with an improved technology base for decisionmaking.

An increase of $3 million, or 3 percent, to $91 million in processing, storage, distribution, food safety, and consumer services research reflects continuing support to increase the knowledge base needed to maximize the use of agricultural products in domestic and export markets. The primary objectives are to increase the quality and use of agricultural products and workers; to reduce losses caused by pests, spoilage, and environmental damage; and to increase the efficiency of processing, handling, and distribution systems.

An increase of $1 million or 5 percent, to $29 million, in human nutrition research would continue support to understanding nutritional needs at various stages in life and food consumption patterns, and to establish standards for Government food and nutrition programs.

Cooperative State Research Service

The 1984 budget recommends a decrease of $13 million, or 6 percent, to $222 million for the Cooperative State Research Service (CSRS). This decrease reflects a steady level of funding for all programs except special research grants and competitive research grants and the planned elimination of the animal health and disease research activity. It is expected that this activity could be conducted by State research institutions under other authorizations as part of their ongoing programs.

Funding for special research grants is expected to decrease $12 million, or 44 percent, to $16 million in 1984, representing completion of several projects. Grant awards are made on a discretionary basis to institutions designated by USDA and university advisory groups. In 1984 grants would be made in the areas of germplasma resources, health research, guayule research, integrated pest management, and tropical and subtropical research. Nearly $7 million is expected to be awarded to projects concerning animal health research in 1984.

Funding for competitive research grants is proposed at $22 million in 1984, an increase of $5 million, or 26 percent. The entire increase reflects the inclusion of animal science basic research to assure an expanded technology base for efficient and adequate production of animal products.

Economic Research Service

The Economic Research Service (ERA) plans to increase 1984 research funding by $6 million, or 15 percent, to $45 million. The objective of the ERS program is to conduct economic research and analysis relating to food and agriculture (national and international), natural resources and rural people and communities. Increased program emphasis would be on collection and analysis of natural resource data; improvement of the reliability and coverage of farm production expenditures and cost of production surveys; and estimation of the interrelationships between the domestic agricultural system and the general economy.

EDUCATION, TRAINING, EMPLOYMENT, AND SOCIAL SERVICES

R&D budget authority in 1984 of $226 million for this function is $6 million, or 3 percent, more than the 1983 funding level.

Research and general education aids programs account for more than three-quarters of the 1984 proposed R&D funding for this function. Programs of the Department of Education would increase 7 percent to $105 million. All of the growth is accounted for by a $10 million increase in vocational and adult education programs, which would result from passage of the administration's proposed Vocational and Adult Education Consolidation Act. Smithsonian Institution R&D support would increase $8 million, to $68 million, in 1984. The Smithsonian conducts basic research in the physical, biological, and social sciences.

Training and employment R&D programs, all conducted by the Department of Labor Employment and Training Administration, show proposed 1984 budget authority of $8 million. The Job Training Partnership Act replaces the Comprehensive Employment and Training Act (CETA) in 1984, continuing research on labor market imbalances caused by skill shortages, plant closings, and demographic factors; public and private sector training; and issues pertaining to the relationship between the labor market and macroeconomic policy.

Social services research and development programs show a 23-percent decline in 1984, to $42 million. A 12-million decrease to $11 million for Human Development Services (HHS) is consistent with administration policy to reduce or eliminate support for programs that do not provide direct services. Child welfare and child abuse programs would be reorganized into a Human Resources Research and Demonstrations program in 1984. Head Start research would continue at a reduced level. Social services discretionary activities, at $9 million, would support R&D in a variety of human services areas. The National Institute of Handicapped Research under the Department of Education would continue research and related activities for the rehabilitation of handicapped individuals.

R&D budget authority for this function as a share of total budget authority is estimated at 1 percent in 1984.

R&D budget authority for education, training, employment, and social services
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$228	$220	$226
Research and general education aids	156	157	173
Department of Education	101	98	105
National Institute of Education	53	49	48
Handicapped Research: Innovation and Demonstration	8	12	11
Vocational and adult education	6	6	16
Special programs and populations	5	6	6
Gallaudet College	2	2	2
Bilingual education	3	2	2
National Center for Education Statistics	2	2	2
National Technical Institute for the Deaf	1	1	1
American Printing House for the Blind	(a)	(a)	(a)
Higher education	1	(a)	-
Library research and demonstrations	(a)	(a)	-
Salaries and expenses	18	17	17
Smithsonian Institution	56	60	68
Training and employment	15	7	8
Employment and Training Adm. (Labor)	15	7	8
Comprehensive Employment and Training Act (CETA)	7	-	-
Youth programs	8	6	-
Unemployment insurance program	-	-	8
Job Training Partnership Act (ATTA)	-	(a)	(a)
Other labor services	2	2	3
Labor Management Services Adm. (Labor)	1	1	2
Employment Standards Adm. (Labor)	(a)	(a)	(a)
Departmental management (Labor)	1	1	1
Social services	55	54	42
Human Development Services (HHS)	26	23	11
Administration for Children, Youth, and Families	20	18	2
Head Start	5	5	2
Child welfare	6	6	-
Child abuse	8	8	-
Administration on Aging	2	1	-
Administration for Native Americans	1	1	-
Social services research	-	-	9
Human resources research and demonstrations	-	-	9
National Institute of Handicapped Research (Educ.)	29	31	31

a Less than $500,000

INTERNATIONAL AFFAIRS

R&D budget authority within the international affairs function is requested at $161 million in 1984, $9 million, or 6 percent, more than the 1983 level. Virtually all of the support provided in this functional area is from the Agency for International Development (AID). Programs under AID consist mainly of applied research to study specific areas associated with basic human needs and to aid in problems of development in developing countries.

R&D budget authority is approximately 1 percent of total budget authority for this function in 1984.

R&D budget authority for international affairs
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$165	$152	$161
Agency for International Development	165	152	161
Arms Control and Disarmament Agency[a]	-	-	-
Department of State[a]	-	-	-

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[a] Agencies with budget authority of less than $150 million but more than $10 million in any year needed only to submit a consolidated schedule of budget data to the Office of Management and Budget. They were not required to report on R&D activities separately.

ALL OTHER FUNCTIONS

The remaining six functions represent areas in which R&D activities play a relatively small part. The tables showing program levels are presented in descending order of 1984 R&D budget authority. Together the R&D budget authority for these six functions amounts to approximately $387 million in 1984, a 3-percent decrease from the $397 million shown in 1983.

Changes in 1984 for these functions are as follows:

- A 1-percent, or $2 million increase, to $159 million, for veterans benefits and services with the larger share of funding devoted to medical research.
- A 15-percent, or $16 million decrease to $91 million, for commerce and housing credit, including a $14 million decrease in National Bureau of Standards (Commerce) R&D programs.
- A 3-percent, or $1 million, increase to $43 million for income security R&D programs.
- An increase of 25 percent, or $9 million, to $42 million for administration of justice programs, with the largest gain in Federal Bureau of Investigation (Justice) R&D programs for the continued development of the Automated Identification Division System (AIDS).
- An 18-percent, or $9 million, decrease to $39 million for community and regional development R&D programs.
- An 18-percent, or $2 million, increase to $12 million for general government R&D programs.

For individual functions the share of R&D programs within the budget authority total is 12 percent for commerce and housing credit; 8 percent for administration of justice; 6 percent for community and regional development; 2 percent for income security; and less than 1 percent for each of the others.

The share of R&D budget authority within total budget authority for all these functions together is slightly more than one-tenth of 1 percent in 1984.

R&D budget authority for veterans benefits and services
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$139	$158	$159
Veterans Administration	139	158	159
Medical research	128	141	143
Investigator-initiated studies	92	105	107
Cooperative studies	10	12	12
Career development	11	13	13
High priority research	6	8	8
Agent orange studies	9	4	4
Rehabilitation research	7	10	9
Health services research	3	4	4
Program direction	3	3	3

R&D budget authority for commerce and housing credit
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$104	$107	$ 91
National Bureau of Standards (Commerce)	87	92	78
Measurement research and standards	39	38	38
Engineering measurements and standards	16	18	14
Core measurement research for new technologies	10	12	12
Technical competence fund	7	7	8
Computer sciences and technology	11	9	3
Fire research	1	5	-
Central technical support	2	3	3
National Oceanic and Atmospheric Administration (Commerce): Research pertaining to American fisheries	2	1	-
National Telecommunications and Information Administration (Commerce)	11	9	8
Bureau of the Census (Commerce)	3	3	3
Patent and Trademark Office (Commerce)	1	1	1
General administration (Commerce)	-	1	1
Federal Communications Commission[a]	-	-	-
Federal Trade Commission[a]	-	-	-

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[a] Agencies with budget authority of less than $150 million but more than $10 million in any year needed only to submit a consolidated schedule of budget data to the Office of Management and Budget. They were not required to report on R&D activities separately.

R&D budget authority for income security
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$ 32	$ 42	$ 43
Social Security Administration (HHS)	17	26	31
Departmental Management (HHS)	13	15	11
Pension Benefit Guaranty Corporation (Labor)	1	1	1

R&D budget authority for administration of justice
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$ 31	$ 33	$ 42
Federal Bureau of Investigation (Justice)	2	3	19
Office of Justice Assistance Research and Statistics (Justice)	22	22	16
Customs Service (Treasury)	3	3	3
Drug Enforcement Administration (Justice)	1	2	2
Federal Prison System (Justice)	1	1	1
General administration (Justice)	1	1	1
Immigration and Naturalization Service (Justice)	1	1	(a)
Office of Protection Research (Treasury)	(a)	(a)	(a)

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[a] Less than $500,000.

R&D budget authority for community and regional development
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$ 63	$ 48	$ 39
Department of Housing and Urban Development.	19	17	18
Housing markets	12	10	9
Housing programs	2	2	2
Local government management	1	2	2
Community and urban development	1	2	2
Safety and standards	1	2	2
Fair housing	1	(a)	(a)
Research support	1	1	1
Tennessee Valley Authority	30	20	22
Economic Development Administration (Commerce)[b]	10	10	-
Federal Emergency Management Agency[c]	4	-	-

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[a] Less than $500,000.

[b] The administration will phase out all EDA activities by 1984. Funding activities for EDA programs will continue to be available in 1984 through community development block grant and urban development action grant programs.

[c] Funding for FEMA programs was transferred to the national defense function in 1983.

R&D budget authority for general government
/Dollars in millions/

	1982 actual	1983 estimate	1984 estimate
Total	$ 10	$ 10	$ 12
Internal Revenue Service (Treasury)	6	6	9
Bureau of Engraving and Printing (Treasury)	4	4	3
Office of Personnel Management[a]	-	-	-
Library of Congress[a]	-	-	-
Advisory Commission on Intergovernmental Relations[a]	-	-	-

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[a] Agencies with budget authority of less than $150 million but more than $10 million in any year covered needed only to submit a consolidated schedule of budget data to the Office of Management and Budget. They were not required to report on R&D activities separately.

END

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